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MARCH 1982 NUMBER 163

Monthly Report on the Uranium Market

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MONTHLY REPORT ON THE URANIUM MARKET

March 1982 No. 163

R. WESLEY MILLER, *EDITOR*

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FOREWORD

We are pleased to announce that Mr. Robert J. Alexander is joining Nuexco this month as Fuel Cycle Consultant. Bob will be assisting Dick Anderser in expanding the capabilities of our Consulting Services Division.

Bob's previous employment was with American Electric Power Company and Portland General Electric Company, where he was actively involved in all aspects of the nuclear fuel cycle. He holds B.S. and M.S. degrees in Engineering from the Georgia Institute of Technology and the New Jersey Institute of Technology, respectively, and an M.B.A. degree from New York University.

Nuexco will host a hospitality suite during the Atomic Industrial Forum's Fuel Cycle Conference '82. The suite will be at the Grand Hyatt New York in New York City, March 21-24.

Beginning with Report No. 162, the Report's index format was changed. A detailed index will now be printed for each Report in the subsequent issue. The index for Report 162 appears on page 26 of this Report. In addition, a comprehensive index for the previous year will be printed in each year's first Report. We hope that this index method will enable our readers to more easily locate specific articles and information.

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MARKET ACTIVITIES

PRICING

The **Exchange Value** as of February 28, 1982, is $23.00 per pound U_3O_8, unchanged from last month. The ratio of near-term supply to near-term demand for uranium increased somewhat, from 2.5:1 in January to 3.3:1 this month.

There are 10.9 million pounds U_3O_8 equivalent available for sale during the next 12 months, as indicated in the *Market Data* section of this Report. However, it should be noted that not all of this material is available for immediate delivery; nor is all of it available in the form of U_3O_8; nor is all of it US origin; nor is all of it available at the same conversion facility; nor is all of it for sale at $23.00 per pound U_3O_8.

As a consequence, it is not always possible for a buyer to obtain material at Exchange Value when the buyer also insists on other specifics. For example, a willing buyer and a willing seller may agree on a price of $23.00 per pound U_3O_8 for near-term delivery. However, the buyer may also insist on:

1. U_3O_8, as opposed to UF_6.
2. Canadian origin.
3. Delivery at Kerr-McGee.
4. Book transfer.
5. On April 13, 1982.

In such a situation, the seller in question may not be able to meet all of the buyer's very specific requirements. The buyer or seller may be forced to incur significant costs in time and money to overcome the mismatches. It may even be necessary to find a different seller altogether.

The **Transaction Value** as of February 28, 1982 is $23.70 per pound U_3O_8, down $0.30 from January. February's Transaction Value includes 14 transactions totaling 2.2 million pounds U_3O_8 and covers a period of three months.

There are four uranium sales transactions reported this month:

1. A US utility sold 301 thousand to 600 thousand pounds U_3O_8 to a US producer for delivery in the first half of this year.

2. A US producer sold 301 thousand to 600 thousand pounds U_3O_8 to another US producer for delivery in the first half of this year. The contract provides for unusually liberal payment terms.

3. A US utility sold 101 thousand to 300 thousand pounds U_3O_8 to a US producer for delivery in the first half of 1982.

4. A European entity sold 601 thousand to one million pounds U_3O_8 to a US producer for delivery during 1982 and 1983.

Another transaction in the 100-300 thousand pound range is rumored but could not be verified at publication date.

The **Loan Use Charge Rate** remained at six percent. There are indications that, in the near future, additional material may become available for loan at this level.

The **Conversion Value** as of February 28, 1982 is $1.20 per pound U as UF_6, unchanged from last month. Although no secondary market transactions were concluded during February, several are under discussion at price levels consistent with the Conversion Value.

DOE SWU Price Increase

DOE has announced the new separative work prices for deliveries beginning August 21, 1982. The price under Adjustable Fixed Commitment and Long Term Fixed Commitment contracts will be $138.65/swu. The price under Requirements contracts will be $149.85/swu, although this will probably be limited by the ceiling price. The current ceiling price for Requirements contracts is $138.57/swu; the new ceiling price, yet to be determined, will become effective on July 1 of this year.

It is now DOE policy to announce its prices for enrichment services so that they become effective about August 20 of each year. The future announcements will probably be made in late February of each year, to allow the required 180 days' notice before the new prices become effective. As before, the ceiling price for Requirements contracts will be recalculated to become effective on January 1 and July 1 of each year.

AUSTRALIA

Just two weeks after it declared its first dividend since 1964, Mary Kathleen Uranium Ltd. (MKU) announced that it will close its mine next September. The mill will be closed three months later. The mine was rehabilitated in 1976, after a 13-year closure. The recent announcement was not unexpected, since the company has stated in the past that operations would be extended only if additional economic reserves were found. MKU had been involved in an extensive exploration program to find further reserves.

MKU will continue shipping yellowcake from inventory for some time to fulfill contractual obligations. In making this decision, the company is leaving unmined some 1,200 tonnes of contained uranium. That material, together with a stockpile of low grade ore, does not justify new sales contracts at prices lower than the

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company's present operating costs.

Energy Resources of Australia (ERA), operator of the Ranger uranium mine, reported profits of US$ 8.9 million on uranium sales revenues of US$ 41 million in the second half of 1981. The plant was completed on October 1, 1981, so the profits reflect only three months of uranium production. During this period, output slightly exceeded design capacity. Township development and some minor plant items still require some capital expenditure.

Development of the Roxby Downs copper-uranium project has become the most contentious issue in South Australia's state politics. In the next few weeks, state politicians will have to decide whether to allow the project to proceed by passing the indenture bill in Parliament. The bill sets forth the conditions for development, mining rights and infrastructure arrangements. The strong anti-uranium position taken by the opposition parties (Australian Labor Party and Australian Democrats) could seriously affect the timetable of the venture.

The Australian "Synroc" process for solidifying nuclear wastes, developed and patented by the Australian National University, is consistently surpassing expectations at rigorous tests conducted by the Australian Atomic Energy Commission (AAEC). Synroc is also under examination by senior officials of the US nuclear program, and according to AAEC reports, has been selected as the standard method for high level waste disposal of the US fast breeder program.

According to the Director of the AAEC, its efforts to develop an Australian uranium enrichment process have shown that the use of local technology may become a definite option in plans for an Australian enrichment plant. The Uranium Enrichment Group of Australia (UEGA) is currently considering French, American and European techniques. The pre-feasibility study completed in May 1981 concluded that the local centrifuge technology was sound, but that Australian manufacturing capacity was limited. It admitted that some features of the AAEC technology could be integrated with overseas technology to mutual advantage.

EUROPE

Recently, a public opinion poll conducted in **Switzerland** about national plans for handling the storage of radioactive waste indicated that:

1. 68 percent of those polled believe the National Institute for the Storage of Radioactive Waste (NAGRA) is competent to handle the problem.
2. 62 percent support the drilling program proposed by NAGRA to help select the best site for the disposal facility.
3. 57 percent are convinced that safe underground storage of radioactive wastes is technically feasible.
4. 30 percent oppose the overall NAGRA program.
5. 29 percent oppose the NAGRA proposed drilling program.

In February, the Swiss government granted NAGRA a license to bore eleven test holes in specific areas to determine the geological suitability for underground storage of radioactive waste. Plans call for starting drilling early this summer, probably in the canton of Zurich or Argau. The complete program of drilling and evaluation is scheduled to be completed by 1985.

In **West Germany**, the nuclear power program recently received much needed support in two different areas:

1. The Federal Ministry of the Interior approved the beginning of construction on three light water reactor projects, namely Biblis Unit C, Isar Unit 2 and either Hamm or Elmsland. The Ministry approval is a prerequisite for the local state authorities to endorse the start of construction on any nuclear reactor project in their respective areas.

The Bavarian state authorities will probably give their approval this month for the start of construction for the Isar Unit 2 project. However, state approval for Biblis Unit C may be delayed by the local authorities, as there are some local political differences to be resolved first.

2. The Federal Government gave unofficial assurance to the utilities that the government would eventually grant an operational license to the SNR-300 (Kalkar) fast breeder reactor project, provided certain defined technical criteria were met. As a result, the utilities in mid-February increased their pledge of financial support by approximately one billion DM.

Although the official government decision on the project is not expected before this summer, additional utility financial support was needed now to keep the project alive. Since the utilities had refused to commit more money without assurance that the plant could be eventually licensed, the project's future appeared in doubt until the compromise was reached. The project is scheduled to be operational sometime between 1985 and 1987.

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MARKET ACTIVITIES

FAR EAST

On January 26, **Japan's** Ministry of International Trade and Industry issued a construction permit to Japan Atomic Power Co. (JAPC) for its Tsuruga Unit 2, a 1,160 MWe PWR. JAPC's permit application was submitted in March, 1979, but authorization was delayed because of the TMI incident and more recently because of last year's radwaste leak at JAPC's Tsuruga plant. Construction work on Unit 2 is scheduled to begin in April and commercial operation is now slated for June, 1987. JAPC's original target was a March, 1986 commercial operation date.

The construction permit followed closely upon an announcement by the JAPC president of the utility's financial difficulties. The financial problems are largely due to the cost of rebuilding the contaminated radwaste facility and also because of the money paid as compensation to local residents affected by the Tsuruga incident. A detailed look at the Tsuruga incident and its effects appears in the *Market Analysis* section of this report.

UNITED STATES

Construction delays and financial difficulties continue to plague US utilities:

1. Public Service Company of Oklahoma (PSO) cancelled its two-unit Black Fox Station Nuclear Project. The licensing application, pending before the NRC since 1975, was withdrawn primarily due to financial considerations and extensive delays in construction.

A consultant to the Oklahoma Corporation Commission has recommended the construction of a coal-fired plant instead. PSO's parent company, Central & South West Corp., is still considering its options.

2. Houston Lighting & Power Co. (HL&P) is reconsidering its plans to build its one-unit Allens Creek nuclear generating unit. The plant, first planned as a two-unit station, was once scheduled to come on line this year at a total cost of $1.2 billion. HL&P now estimates it would cost more than $2 billion to complete just one unit by 1991. Like Public Service Company of Oklahoma, Houston is considering, among other options, using the site for a coal unit. Last November, Standard & Poor's lowered its ratings on HL&P securities from AA to A due to economic and construction scheduling uncertainties associated with the project.

3. Moody's Investors Service lowered its bond rating on Washington Public Power Supply System (WPPSS) Units 1, 2 and 3 from AAA to AA. Again, extensive delays in construction and economic factors influenced the decision. On the other hand, a recent WPPSS bond offering was received so well by investors that it was increased from $500 million to $850 million.

Rochester Gas & Electric expects to resume operations at its Ginna unit on May 1 after a three-month shutdown to repair steam generator tubes damaged in the January loss of coolant accident. Final damages have not yet been determined, but are expected to exceed the utility's $1 million insurance deductible limit.

Recent developments among US uranium producers:

1. Western Nuclear reduced mining and milling operations to four days a week at its three uranium mining and milling operations. The cutbacks affect the Smith Lake mine near Grants, New Mexico, the milling of stockpiled ore at Jeffrey City, Wyoming and the Sherwood operation in Washington.

2. Exxon transferred all mineral geologists at its Albuquerque office to the oil and gas division effective February 1, 1982.

CORRECTION

Last month's Nuexco Report 162 stated incorrectly that "Southern California Edison's San Onofre Unit 2 was licensed for fuel loading and low power testing by the NRC last month." The article should have stated that, since the *Atomic Safety and Licensing Board* had given its approval for fuel loading and low power testing, the NRC could be expected to issue a license for fuel loading and low power testing within the next few weeks.

On February 16, 1982, the NRC did issue a license for Southern California Edison to load fuel and test its San Onofre Unit 2 up to five percent power. Hearings concerning the plant's preparedness to meet emergency standards will be required before the plant is allowed to operate at full power.

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MARKET DATA

Market Opportunities are *active* inquiries in the uranium market to buy, sell, borrow or lend. The data presented in this section are in no way intended to be indicative of the entire uranium market for the time period covered.

URANIUM SUPPLY

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	1 to 2 Years	2 to 5 Years	Remarks
Available for Sale:				
1475	1,500			UF_6
1490	1,000			
1575			500	Long Term
1581	150	150	150	Long Term
1584	500			
1610	200			
1637	500			
1684	500			UF_6
1738	750			UF_6
1739	600	750	750	Long Term
1774	50			
1804	615			
1805	500	500	500	Long Term
1807	700			
1810		750		
1812A	1,000			
1814	250			
1818		250	250	Long Term
1872	250			
1875A	350	350		
1877	50			
1895	1,400			UF_6
TOTAL:	10,865	2,750	2,150	
Available for Loan:				
1695	225	325	325	UF_6
1742	200			
1785	1,000			
1815	1,000			UF_6
TOTAL:	2,425	325	325	

[1]Measured from the date of this Report

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MARKET DATA

Market Opportunities are *active* inquiries in the uranium market to buy, sell, borrow or lend. The data presented in this section are in no way intended to be indicative of the entire uranium market for the time period covered.

URANIUM DEMAND

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U_3O_8) 0 to 1 Year	1 to 2 Years	2 to 5 Years	Remarks
Inquiries to Purchase:				
1410		1,500	1,500	
1459			200	Long Term
1603			100	Long Term
1634		400		
1699	300	300	250	
1724	650	500	500	Long Term
1732	100			
1744	1,000			
1775	20			
1841	100			
1842			500	Long Term
1868	300	200	200	Long Term
1875	350	350		
1888			500	Long Term
1889			500	Long Term
1891	500			
TOTAL:	3,320	3,250	4,250	
Inquiries to Borrow:				
1621	300			
1780	500			
1812	1,000			
1885	600			
1890	500			
TOTAL:	2,900			

[1]Measured from the date of this Report.

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MARKET DATA

Market Opportunities are *active* inquiries in the secondary market for UF_6 conversion services. The data presented in this section are in no way intended to be indicative of the entire market for the time period covered.

CONVERSION SUPPLY

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U as UF_6)			Remarks
	0 to 1 Year	1 to 2 Years	2 to 5 Years	
1451	75			
1584	350	300	300	Long Term
1607	1,000			
1609	500	1,500	1,000	Long Term
1619		250	50	
1661	200			
1684	450			
1764	100			
1840	200			
1886	500			
TOTAL:	3,375	2,050	1,350	

CONVERSION DEMAND

Nuexco Reference Number	Delivery Period[1] (Thousands of Pounds U as UF_6)			Remarks
	0 to 1 Year	1 to 2 Years	2 to 5 Years	
1594		400	950	Long Term
1622	500	900		
TOTAL:	500	1,300	950	

[1]Measured from the date of this Report

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MARKET DATA

CURRENT TRANSACTIONS[1]

Uranium Transactions

Nuexco Reference Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller Group	Buyer Group	Remarks
1670	82-83	601-1,000	98	Europe	US	
1709	82	101-300	98	US	US	
1715	82	301-600	102	US	US	
1717	82	301-600	100	US	US	

Conversion Transactions

Nuexco Reference Number	Delivery Period	Approximate Quantity (thousands of pounds, U equivalent)	Approximate Price as Percent of Current C.V.	Seller Group	Buyer Group	Remarks

None reported.

[1]Transactions listed include not only those in which Nuexco was involved, but also all others of which Nuexco is aware.

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MARKET ANALYSIS

NUCLEAR POWER PROGRESS IN 1981

While the US nuclear power industry suffers negative order rates year after year, the rest of the world progresses.

Total nuclear electric power generation for North America, Western Europe and the Far East in 1981 is shown in Table 1; the corresponding figures for 1980 are shown for comparison. Nuclear generation of electricity in 1981 for the three regions increased 16 percent over 1980 to 706 million megawatt-hours. The biggest increases occurred in France and the US, but Sweden, Finland and West Germany had large percentage increases as well.

France's nuclear generation of approximately 100 million megawatt-hours in 1981 was 60 percent higher than its 1980 output, due to the better-than-expected performance of EdF's plants and the startups of eight new nuclear units. More than 37 percent of the total French electricity production was supplied by nuclear power. In the US, nuclear generation of electricity increased by 24 million megawatt-hours, a nine percent increase over 1980.

Sweden's output increased by 33 percent over 1980. West Germany's output increased by 23 percent and Finland's nuclear generation in 1981 doubled that of 1980.

The sixteen nuclear reactors that started up during 1981 outside the US (excluding Communist areas) are listed in Table 2. Those reactors added approximately 13,800 MWe to the world's installed capacity. The US contributed only 3,363 MWe (Nuexco Report 161, Table 11) to the world total of approximately 17,000 MWe. More than forty percent of the total — 7,240 MWe — came from France. The 1981 total for France does not include Dampierre Unit 2 and Gravelines Unit B3, two reactors that started up in late 1980 and began commercial operations in early 1981.

Table 1

NUCLEAR ELECTRIC POWER GENERATION
(millions of megawatt-hours, gross)

	1980	1981
North America		
Canada	40	43
United States	265	289
Total North America	305	332
Western Europe		
Belgium	12	12
Finland	7	14
France	61	98
West Germany	44	54
Italy	2	2
Netherlands	4	4
Spain	5	10
Sweden	27	36
Switzerland	14	14
United Kingdom	37	33
Total Western Europe	213	277
Far East		
Japan	81	84
Taiwan	8	10
Republic of Korea	3	3
Total Far East	92	97
TOTAL	610	706

Table 2

POWER REACTOR STARTUPS OUTSIDE THE US IN 1981

Country	Plant	Type	Net MWe
France	Blayais 1	PWR	920
	Dampierre 3	PWR	900
	Dampierre 4	PWR	900
	Gravelines B4	PWR	920
	St. Laurent B1	PWR	880
	St. Laurent B2	PWR	880
	Tricastin 3	PWR	920
	Tricastin 4	PWR	920
Japan	Fukushima II-1	BWR	1100
	Genkai 2	PWR	559
	Ikata 2	PWR	566
Spain	Almaraz 1	PWR	930
Sweden	Forsmark 2	PWR	900
	Ringhals 3	PWR	900
Taiwan	Kuosheng 1	BWR	951
Yugoslavia	Krsko	PWR	615

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Table 3

POWER REACTORS ORDERED IN 1981

Country	Plant	Net MWe	Type	Estimated Startup
France	Belleville 1	1270	PWR	1986
	Belleville 2	1270	PWR	1987
	Chinon B3	875	PWR	1986
	Nogent 1	1270	PWR	1987
Japan	Hamaoka 3	1100	BWR	1985
	Kashiwazaki 5	1100	BWR	1989

Although the dividing line between firm orders and announced plans is sometimes blurred, Table 3 shows that six new orders were placed in 1981. France ordered four PWR units totaling approximately 4,700 MWe; Japan ordered two BWR units of 2,200 MWe each.

Table 4 indicates that ten reactors outside the US experienced construction schedule delays in 1981. The ten reactors involve a total of approximately 7,100 MWe. The average delay, weighted by size in MWe, was sixteen months.

The delays enumerated in Table 4 do not represent all that occurred during 1981. For example, delays of less than one year were ignored. Rather, the table indicates where the most significant delays occurred. Nuexco has knowledge of numerous delays not included in Table 4, but it is our policy not to reveal any confidential data about individual clients. Those delays are, however, factored into Nuexco's calculations of Apparent Future Consumption.

Table 4

NON-US POWER REACTOR PROJECTS DELAYED IN 1981*

Country	Plant	Net MWe	Type	Delayed From	Delayed To	Number of Months
India	MAPP 2	220	PHWR	3/82	/84	21
	NAPP 1	220	PHWR	12/83	/86	24
	NAPP 2	220	PHWR	12/84	/87	24
Italy	ENEL 8	982	BWR	12/85	2/87	14
Spain	Cofrentes	930	BWR	10/82	/84	14
	Almaraz 2	930	PWR	/82	6/83	12
	Asco 1	880	PWR	6/81	10/82	16
	Asco 2	880	PWR	6/82	3/84	21
	Lemoniz 1	900	PWR	12/81	6/83	18
Switzerland	Kaiseraugst	925	BWR	/89	/90	12

*Units delayed at least one year: determined by comparing the Commercial Operation Date (COD) listed in the December 31, 1980 Nuclear News World List of Nuclear Power Plants (published in February, 1981) with that listed in the December 31, 1981 list (published February, 1982). Also included are delays noted in 1981 publications but not included in the Nuclear News list.

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MARKET ANALYSIS

US IMPORT-EXPORT BALANCE

Table 5 sets forth Nuexco's estimate of current US import and export commitments for the period 1982-1991. The table includes:

1. Renegotiations of existing contracts.
2. Nuexco judgments as to the quantities that will be delivered under contracts now in force. For example, in some contracts subject to annual price negotiations, failure to agree on the new price terminates or suspends deliveries. In other contracts, the amount to be delivered is a function of production.
3. Nuexco judgments of the amounts of material which will be delivered under existing contracts presently in dispute.
4. Nuexco judgments of the amounts of material which will be delivered under the provisions of litigation settlements which have already been made. For example, some settlements include options, and other settlements were associated, in varying degrees, with production from certain production centers.

The analysis does *not* include commitments for US export or import which have not yet been made. It is important to note that Table 5 is *not* a forecast.

Table 5 shows only one year, 1985, in which US exports exceed imports. During the ten years covered by the analysis, Nuexco's estimate is that current commitments lead to cumulative net US imports of approximately nine million pounds U_3O_8. If the uranium market continues on its present trend, that figure must rise substantially over the next few years.

THE TSURUGA INCIDENT

After a six month suspension, Japan Atomic Power Co.'s (JAPC's) Tsuruga Unit 1 resumed commercial operation on January 22, 1982. The suspension resulted from a March 1981 spillage of radioactive waste which was concealed from the authorities until April.

On March 8, 1981, radioactive liquid waste overflowed from a filter sludge storage tank inside Tsuruga's radwaste building, seeped through openings and cracks in the floor, and was discharged into the sea through a general drain that runs under the building. The general drain carries rainwater and well water, and has no relation to sources of radioactivity, but the radwaste building, added in 1971, was constructed over this waterway.

The actual cause of the spill was operator error. After transferring sludge, the operator left cleaning water running. A new operator came on duty and did not check the water level of the storage tank in question. The following morning, the pump for drawing overflowing liquid waste from the floor began to work automatically and the alarm sounded. At that time, there was no one in the control room of the radwaste building, so there was

Table 5

US IMPORT-EXPORT BALANCE
(millions of pounds U_3O_8)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Imports										
Annual	6.1	5.4	5.2	2.5	2.7	1.8	2.0	2.0	1.9	1.4
Cumulative	6.1	11.5	16.7	19.2	21.9	23.7	25.7	27.7	29.6	31.0
Exports										
Annual	5.9	4.6	3.1	2.8	1.4	1.3	1.0	0.9	0.8	0.1
Cumulative	5.9	10.5	13.6	16.4	17.8	19.1	20.1	21.0	21.8	21.9
Net Imports/(Exports)										
Annual	0.2	0.8	2.1	(.3)	1.3	0.5	1.0	1.1	1.1	1.3
Cumulative	0.2	1.0	3.1	2.8	4.1	4.6	5.6	6.7	7.8	9.1

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no response. Later, an operator found a liquid waste leak on the floor. He traced it to its source and found that the cleaning water was still running. He closed the valve and built a dam with absorbent cloth to check the spread of liquid waste. Six JAPC operators were there from 4:15 p.m. to 6 p.m. on March 8 decontaminating the area. The maintenance subcontractor did decontamination work throughout the following week. The liquid waste overflow amounted to 14.5 to 15 cubic meters. Buckets and absorbent cloths were used to recover 13 cubic meters.

A total of 56 workmen, eight from JAPC and 48 subcontractors, took part in the 16-day decontamination process. However, JAPC did not report the incident to the proper government officials. Discovery of the radwaste leakage stemmed from environmental monitoring done monthly by the Research Laboratory of Public Health of Fukui Prefecture. The group took samplings of gulfweed from Urazoko Bay and found on April 17, 1981, that general drainage mixed with radioactive material flowed into the sea. The samples showed that radioactivity had increased from the previous month. The laboratory reported its findings to JAPC.

Subsequent samples taken in the plant vicinity by JAPC detected some radioactivity around the general waterway outlet adjacent to the seawater intake. JAPC reported these findings to the Agency of Natural Resources and Energy (ANRE) of MITI on April 17, 1981. In the course of the investigation by ANRE officers, they found that other incidents had also taken place at the plant which had neither been reported to the head office of JAPC nor to ANRE, the group responsible for the supervision of reactor plants. Specifically, three small leaks, two of cooling water and one of liquid waste, had occurred during January of 1981.

The media reported these accidents and charged the government with lack of supervision of reactor operation. JAPC was cited for failure to report the incidents and failure to comply with applicable safety regulations, especially the reporting obligation. The charge against the government revolved around MITI's approval for construction of the additional radwaste building despite the fact that the general waterway ran under the proposed new building.

Although the workers in the decontamination effort received no more than the permissible amount of radiation exposure, the public perceived that the workers were seriously injured from excessive exposure. Exaggerated reports by the news media fostered this public impression; the public's general lack of understanding about the differences between different types of radiation made them susceptible to the press reports. Also, many people believed that local sea products were totally contaminated by radioactive material despite an ANRE investigation which revealed that 26 species of fish taken from Tsuruga Bay all contained less than the minimum detectable amount of radioactive contamination.

On May 11, 1981, the Residents Association (in Fukui Prefecture) Against Nuclear Power Plants lodged a legal complaint against the president of JAPC and the site manager of the Tsuruga plant, charging them with violating the Reactor Regulation Law and Electric Utility Law. This marked the first time in the history of Japanese nuclear power development that a complaint had been filed with prosecution authorities relating to a nuclear power plant accident.

After the disclosure of the incidents, JAPC submitted a 65-page report to ANRE setting out the results of its investigation. The report cited the lack of a clearly defined system of reporting at the Tsuruga plant as one reason for the incident. The report also acknowledged that a more thorough study of the design and construction of the new radwaste building should have been done, particularly to coordinate the new and old facilities.

Regarding future improvements, the report stressed that: 1. proper attention would be given to any expansion or repair of buildings; 2. the warning system in the radwaste building would be improved, connecting it to and displaying it in the central control room.

Following the submittal of the report to ANRE, JAPC's eight top officers, including President T. Suzuki, resigned from the company. The eight top management positions were filled at a meeting of the Board of Directors.

Based on the JAPC report, ANRE prepared its own study and submitted it to Japan's Nuclear Safety Commission. The report recommended that the commission suspend operation of the Tsuruga power plant for six months, in accordance with the Reactor Regulation Law, because of safety regulations violations. ANRE also instructed JAPC to take measures to rectify the situation including: 1. a thorough inspection of the feedwater heaters; 2. the installation of a new liquid waste filtering room; 3. a unification of the control functions in the waste treatment facilities; 4. the removal of contaminated solids; 5. the sealing of the general waterway and openings leading to it; 6. better

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education and training of the employees, including supervisors, of the Tsuruga plant. JAPC was also instructed to settle fairly the question of compensation to those affected by the incident.

As a result of the Tsuruga incident, ANRE laid out a series of measures aimed at improving the standards of nuclear plant operations in Japan. These include safety improvements, better inspection procedures and the formulation and clarification of additional technical and safety standards. Other Japanese power companies were instructed to inspect their radwaste treatment facilities. They also submitted to ANRE their procedures for reporting to ensure that they met the requirements of applicable regulations and laws.

Based on ANRE's instructions, JAPC prepared a plan, subsequently approved by ANRE, for modifying the Tsuruga radwaste facilities. The modification work was completed and passed ANRE's inspection in December 1981. In addition, JAPC's improved safety management system was reviewed and approved by ANRE. ANRE submitted the result of its inspection on the modification work as well as improved safety management system to the Nuclear Safety Commission and the commission accepted it without comment on December 17, 1981.

JAPC's compensation to the local residents affected by the Tsuruga incidents has been settled. On November 11, 1981, the compensation to the Fukui Fisherman's Association was approximately $4.5 million. This compensation covers the lost sales of fishery products put on the market by the association. On December 17, 1981, the compensation to tourism-related businesses in the Tsuruga area was settled at approximately $855,000.

In general, the Tsuruga incidents gave impetus to the associations opposing construction of nuclear power plants. Although opposition has subsided, both government and utility companies will be required to expend greater efforts to obtain local consensus prior to the siting of reactors.

Another result of the incident has been a decrease in the public confidence in the safety of nuclear power. A recent government poll shows that public confidence in nuclear safety measures dropped considerably, from 54 percent before the Tsuruga accident, to 27 percent. While the Tsuruga incidents had a great deal of impact on the public at the time, the Japanese program of nuclear power development will not be greatly affected in the long run.

The recent reduction of Japan's official target for nuclear generating capacity installed in 1990 is not attributable to the Tsuruga incident. Rather, it is due to reduced forecasts of industrial demands for electricity. The incident did cause delays of a few months in the schedules for licensing and public hearings on other nuclear units.

STATUS OF US WASTE DISPOSAL EFFORTS

The United States legislative process has, so far, been unable to overcome bureaucratic, environmental and anti-nuclear forces in developing a comprehensive waste management plan. The Reagan Administration remains committed to reprocessing as a central feature of such a plan, but representatives from the commercial sector have repeatedly rejected the suggestion that they finance a reprocessing plan. DOE has pushed back the time period when an AFR (away-from-reactor site storage facility) would be needed because of utility expansion of on-site storage areas. Even with a commitment to go ahead, the siting of such storage areas would be a problem.

In the US, the issue of nuclear waste storage and disposal is being pursued on four major levels.

1. Several versions of nuclear waste legislation have been drafted in the relevant House and Senate committees. However, compromises must be made before the legislation can be passed by Congress.

2. A waste conference proceeding before the Nuclear Regulatory Commission is addressing the question of whether off-site storage or disposal of nuclear waste will be in place by the year 2008.

3. As the result of a 1980 Congressional directive that the issue be handled at the state level, organized regional groups are dealing with questions of low-level waste.

4. A draft report of a three-and-one-half-year study of high-level waste management by Congress' Office of Technology Assessment emphasizes a firm commitment to developing waste disposal capability and presents guidelines for a thorough waste management program.

Details of the actions within these four areas are discussed in the following paragraphs.

In the Senate, the Energy Committee and the Environment and Public Works Committee are reviewing each other's draft bills and are trying to develop a compromise version of nuclear waste legislation. The two drafts agree with respect to: establishment of a federal AFR storage facility; development of an unlicensed Test and Evaluation Facility (TEF); construction of at least

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one geologic repository for permanent disposal of high-level waste; and development of monitored retrievable storage facilities. The main issues under dispute include: burial versus storage of nuclear waste; financing of the facilities; and timing and siting of the TEF.

Besides inter-committee differences, two other aspects of the legislation are under attack. The problem of reconciling civilian and defense waste programs must be addressed; should military waste disposal come under the purview of the NRC? Also, a strong group of Senators are opposed to the AFR provisions in both versions of the bill. Corresponding legislation in the House of Representatives has two versions which also must be consolidated into a compromise bill. The interim storage issue is one area over which disagreement continues.

The biggest problem ahead for nuclear waste legislation is reaching agreement between a House version and a Senate version. It is likely that each house of Congress will pass a bill covering the issue. However, the two versions will probably be very different and must be reconciled in a conference committee made up of representatives from both the House and Senate. A bill is not signed into law until the same version is passed in both houses of Congress. Drafts of House legislation reflect many of the environmental concerns regarding nuclear waste; the Senate versions are more compatible with the industry outlook. In the past, it has been difficult to get legislation through conference committees in an election year. This session the nuclear waste issue must contend with important budget and appropriations bills. Another factor is the likely proposal of legislation to dismantle the DOE. The two issues, waste disposal and dismantling of DOE, will be difficult to separate. There is general agreement in Congress on the need for developing a permanent burial facility and the need to have state-level participation in the siting, but to develop and agree upon specific measures will require effort the Congress is not likely to apply this year.

It does not seem that the Reagan Administration will make known its views on the different versions of legislation before the major points are resolved. However, the Administration has, through the Department of Energy, reiterated its emphasis on the swift development of nuclear waste storage and disposal facilities. DOE testimony given before the NRC waste confidence hearing expressed certainty of the presence of a licensed nuclear waste repository in 25 years. The hearing is the result of a 1979 request by a federal court for the NRC to give a vote of confidence or no confidence to the question of whether off-site storage or disposal of spent fuel would be available by 2008. Although the Reagan Administration emphasizes reprocessing rather than spent fuel, DOE officials argue that the answer to the question of *safe* disposal has not changed. It does appear, however, that the Reagan Administration is looking more at spent fuel, not only because of the current hearings, but also because support for commercial reprocessing has not been forthcoming.

Since 1980, when Congress passed an act for the establishment of regional compacts between member states to handle low-level wastes, not much action has taken place. The groups are taking quite a long time to organize themselves and are tied up with eligibility dates and exclusions within the compacts. They have not yet begun to focus on the management of low-level waste.

Concerning high-level waste management, a draft report from the Office of Technology Assessment asserts that a commitment to the development of waste *disposal* technology must be made now to ensure that the US can choose between storage and disposal in the future. The report lays out the guidelines for a waste management program which includes: commitment to a date for accepting waste from utilities at several mined geologic repositories and a program to follow through on the commitment; assurance of government financial and managerial support for such a program; establishment of oversight and regulatory coordinating of the program; and provisions for handling state and local input.

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RAW MATERIALS

THE ARIZONA STRIP

Introduction

Competition for land and the right to explore for uranium has never been more intense along the Arizona Strip. Recent mining and exploration activities in the area by Energy Fuels Exploration Company of Denver, Colorado has attracted the attention of major companies and a number of individuals interested in the discovery of new uranium deposits. Since September 1981, 20 to 25 thousand lode mining claims have been staked in the northern portions of Mohave and Coconino Counties, Arizona. The area claimed to date totals approximately 400 to 600 thousand acres. Figure 1 is a location map for the Arizona Strip and immediately south of the Colorado River showing the approximate areas of heavy claims staking.

The exploration target throughout the district is uranium mineralization in breccia pipes. Early prospecting in the general area revealed a number of breccia pipes exposed by erosion along the flanks of the Colorado River drainage system. Based on this relationship, geologists concluded that the occurrence of 100 to 150 breccia pipes was possible throughout the drainage system. Recent exploration and geologic interpretation indicates that pipe structures exist away from the main drainage system. Prospectors are now anticipating that discovery of several hundred pipes is a good probability. If so, the opportunity to discover a new uranium deposit is greatly increased.

A breccia pipe consists of a circular, chimney-like mass of highly fragmented rock resulting from the subsidence of large rock segments into a void created by solution activity in a lower formation. Continued subsidence causes fragmentation or "brecciation" of the large rock segments as the solution void fills with collapsed debris. Concentric fracturing and faulting are common to the outer edge of the pipe structure as a component of rock stress created by subsidence within the pipe. This feature, called the annular ring, will occur immediately adjacent to the pipe structure or in an uneven pattern radiating out from the structure by tens of meters. Thus, pipe structures vary considerably in size and pattern, but most are identifiable by the common structural features of brecciation and an annular ring.

Uranium mineralization usually occurs in association with other minerals in the highly fractured breccia zone or the area influenced by the annular ring. Occasionally, mineralization occurs as bedded deposits in undisturbed rock beyond the annular ring. Vertical and horizontal zonation of minerals is evident in the known mineralized pipes. Both primary and secondary minerals are present.

Exploration History

Uranium mineralization was known to occur in at least nine breccia pipes in the western US prior to 1965. Five of these are located in the present area of interest and along the south bank of the Colorado River. In fact, the Orphan Lode pipe, which has yielded 4.4 million pounds of uranium, is located south of the river. (The Orphan Lode mine is described in Nuexco Report 123, October 1978.) Exploration and mining activity in the area ceased with the closure of the Orphan Lode mine in 1969. However, Western Nuclear, Inc. showed renewed interest during the early 1970's, concentrating exploration on the Hack Canyon pipe where uranium mineralization is known to occur in association with copper. (The Hack Canyon mine produced copper in the early 1950's; about 5000 pounds of uranium was produced later, but all mining stopped when the operation became unprofitable in the mid-1950's.)

The discovery of additional uranium in the Hack Canyon pipe in 1973 intensified interest in the area by other companies. A modest land rush developed and about 2000 mining claims were staked. However, interest diminished rapidly due to the lack of new discoveries. Western Nuclear and Exxon Minerals were among the few companies to remain in the area with low-key exploration programs.

Energy Fuels leased all property controlled by Western Nuclear in late 1978 and immediately set out to expand the uranium reserves at the old Hack Canyon mine. Additional reserves were drilled out and by the end of 1980, Energy Fuels was mining at the rate of about 200 tons of ore per day from a deposit in an adjacent breccia zone about 1000 feet east of the old mine site.

Energy Fuels continued exploration in the immediate vicinity of the old Hack Canyon mine and eventually discovered another mineralized breccia pipe approximately one-half mile to the west. A second mine is now in production with access to the ore through a 1000 foot long decline. Total production from the two mines varies from 300 to 400 tons ore per day, all of which is trucked 327 miles to the Energy Fuels mill at Blanding, Utah.

Energy Fuels plans to develop still another ore deposit. The company is currently seeking the final permits required to mine the Pigeon Pipe located about 22 miles northeast of Hack Canyon. A vertical shaft will be sunk to gain access to the orebody after all permits

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RAW MATERIALS

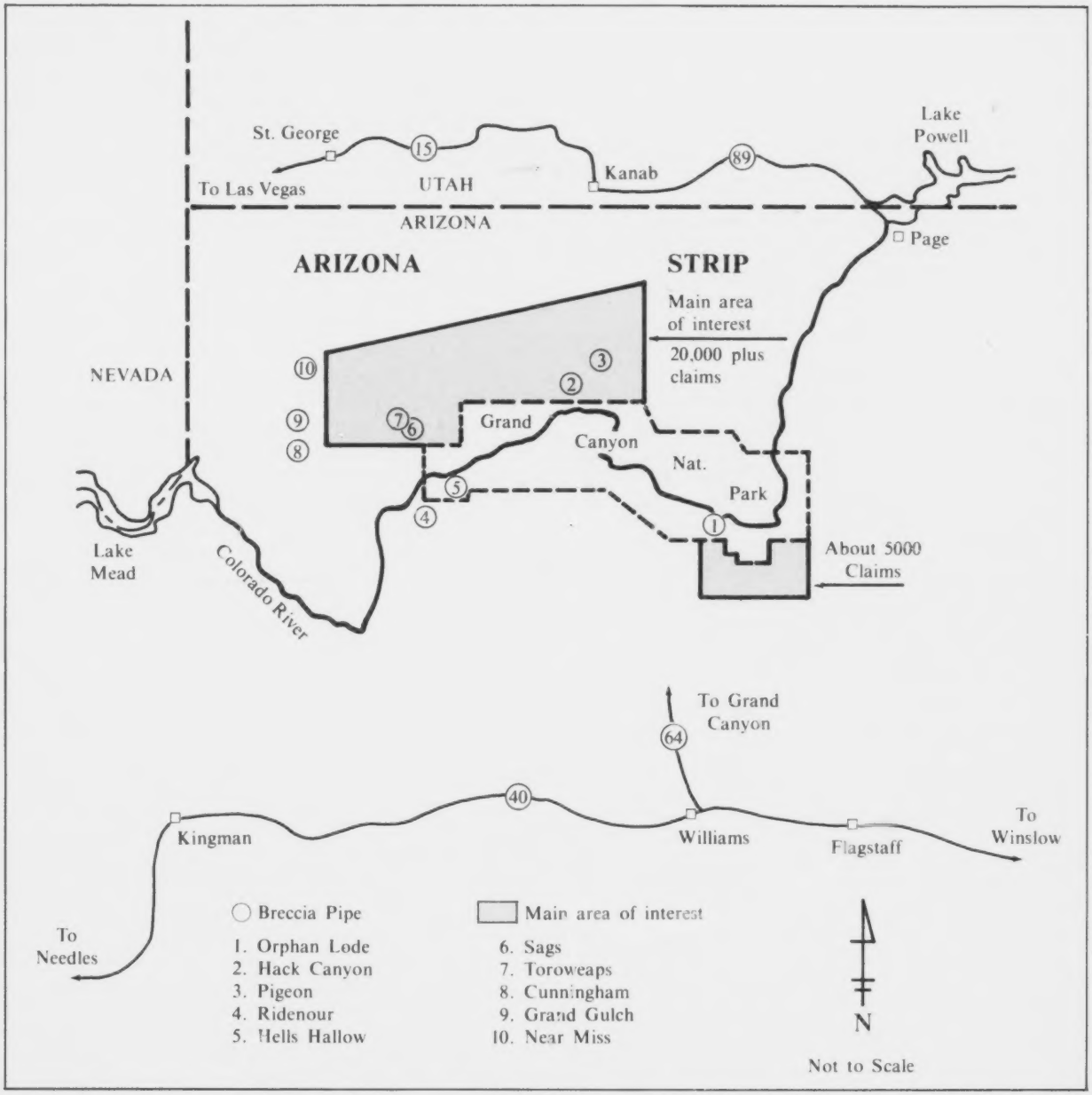

Figure 1

LOCATION MAP OF URANIUM EXPLORATION AREAS ALONG THE ARIZONA STRIP AND SOUTH OF THE COLORADO RIVER. TEN BRECCIA PIPES IMPORTANT TO THE DISTRICT ARE SHOWN TO ILLUSTRATE WIDE DISTRIBUTION THROUGHOUT THE DISTRICT.

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have been approved. Production of ore could begin by late 1982. In addition, the company continues to explore for breccia pipes. Surface and subsurface geology are being evaluated at the present time.

The persistent activity by Energy Fuels during the past three years has drawn other companies into the district. Pathfinder Mines Corporation of San Francisco, California is currently the principle competitor to Energy Fuels for favorable land throughout the Arizona Strip. Rampart Exploration Company and a few individuals hold small land positions along the strip as well. Although the activity is far less intense south of the river, the participants vary considerably. The claims are held by Gulf Mineral Resources Company, Phillips Petroleum Company, Energy Reserves Group, Rampart Exploration Company and a group of individuals. Energy Fuels and Pathfinder Mines are not involved south of the river.

Geology

The breccia pipes found in the Grand Canyon region of Arizona were formed during a multi-stage development period whereby migrating aqueous solutions created caverns in the Redwall Limestone of Mississippian age. Eventual collapse of overlying formations (up through Permian age) into a cavernous area began, progressing upward to form a vertical pipe-like structure partially filled by the down-dropped blocks. Rapid erosion caused by increased solution activity allowed the blocks to subside further. The break-up continued, forming a core of brecciated material. The breccia zone shows varying degrees of porosity and permeability according to rock-type and the effect of prolonged exposure to aqueous solutions. Development of the annular ring structural features are directly associated with subsidence in the pipe and subsequent rock stress created by collapse and arching characteristics of the formations.

The surface expression of a breccia pipe usually, but not always, has visible evidence of subsidence in the Kaibab Limestone and Moenkopi Formation which forms the surface throughout much of the district. However, most pipes are identifiable on the surface by pale green and yellow to white rock alteration which shows at least a partial outline of the pipe structure. Evidence of brecciation and annular ring features may be revealed by detailed on-site examination. It may be noteworthy that not all surface subsidence, often called sinkhole topography, is related to breccia pipes. Numerous sinkholes appearing in succession or in clusters are commonly associated with ancient or existing stream valleys. The features mentioned above are no more than subtle guides for locating a breccia pipe. Making an ore discovery is considerably more difficult and requires the application of modern geologic techniques.

Mineralization

The probable source of uranium mineralization in the breccia pipes was the oxidizing, mineral-rich solutions ascending from the massive sandstones of the Supai Formation to saturate and alter the breccia zone and the annular ring structures. The solutions contained an abundance of minerals as evidenced by the sixty different metallic minerals identified in the Orphan Lode mine. However, the only minerals of economic interest are uranium and copper. It is apparent that formation permeability and porosity were important to the localization of the ore minerals.

There is evidence that intense alteration and remobilization of minerals occurred as a result of continuous migration of supergene (descending) and hypogene (ascending) solution activity during the Miocene and Pliocene times. Mineralization has been noted in all formations influenced by the pipe structure. However, enriched zones of large high-grade accumulations of ore are limited to a select environment within the structure. High-grade ores occur in the annular ring and the breccia zone of the Supai Formation at the Orphan Lode mine, but are primarily limited to the Hermit Shale segment of the breccia zone at the Hack Canyon Mines. The latter occurrence supports the theory of upward migration of mineral-rich solutions and enrichment of ore by the action of miocene/pliocene solution activity. Uraninite and coffinite are the main ore minerals present in the district; torbernite and metatorbernite are perhaps the most important secondary minerals present out of eight to twelve less common supergene minerals found in the Orphan Lode mine.

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STATISTICAL DATA

EXCHANGE VALUE $23.00/lb. U_3O_8
Determined as of February 28, 1982

Definition[1]

The Exchange Value is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the last day of the month.

Derivation

Nuexco bases the Exchange Value upon:

A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Exchange Value:

A. The price of uranium delivered or to be delivered under old contracts.
B. The price of uranium delivered in connection with contract renegotiations or other than arm's length transactions.

[1]In December, 1981, Nuexco published a history of the Exchange Value which chronicled, month-by-month, changes in its definition, usage and derivation. Copies are available upon request.

TRANSACTION VALUE[2]
Determined as of February 28, 1982

$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
23.70	2.2	14	3

Definition

The Transaction Value is a weighted average price of recent transactions, and is based on prices paid for U_3O_8 in transactions closed within the previous three-month period and for which delivery was scheduled within one year of the transaction date. At least ten transactions totaling at least two million pounds U_3O_8 are included in each calculation, or the sample time is extended as necessary to include these minima. Foreign currencies are converted to US dollars as of the transaction date.

[2]Transaction Values for 1976 through 1981 and their associated parameters (millions of pounds, number of transactions and number of months) are tabulated on pages 31 and 32 of Report 161 of January 1982.

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STATISTICAL DATA

EXCHANGE AND TRANSACTION VALUES
SINCE JANUARY 1978
Determined as of the last day of the month indicated

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STATISTICAL DATA

HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	35.20	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00										

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38.40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70										

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country	per lb. U_3O_8 in Concentrates	per kg U_3O_8 in Concentrates	per kg U in Concentrates
US (dollar)	23.00	50.71	59.79
France (franc)	139.06	306.57	361.52
FRG (mark)	54.53	120.21	141.76
Japan (yen)	5,419	11,948	14,089
Switzerland (franc)	43.25	95.35	112.44
UK (pound)	12.52	27.61	32.56
Australia (dollar)	21.36	47.08	55.52
Canada (dollar)	28.08	61.90	73.00
Niger, Gabon (CFA)	6,949	15,319	18,065
South Africa (rand)	22.36	49.30	58.14
Sweden (kröner)	132.79	292.76	345.24

[1]Calculated using currency exchange rates published in the Wall Street Journal on the last business day of the month.

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STATISTICAL DATA

CONVERSION VALUE $1.20/lb. U as UF_6
Determined as of February 28, 1982

Definition

The Conversion Value is Nuexco's judgment of the price at which spot and/or near term transactions for significant quantities of conversion services could be concluded in the secondary market as of the last day of the month.

Derivation

Nuexco bases the Conversion Value upon:
A. Data from recently completed transactions.
B. Data from pending transactions.
C. Firm bids to buy and firm offers to sell.
D. Prices purchasers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy, and prices sellers have expressed a willingness to accept, but for which Nuexco is not aware of firm offers to sell.

Comments

Nuexco does not consider the following in determining the Conversion Value:
A. The price of conversion services delivered or to be delivered under old contracts.
B. The price of conversion services delivered in connection with contract renegotiations or other than arm's length transactions.

LOAN USE CHARGE RATE[1] 6%
Determined as of February 28, 1982

Definition

The Loan Use Charge Rate is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the last day of the month.

Derivation

Nuexco bases the Loan Use Charge Rate upon:
A. Data from recently completed or pending loan transactions.
B. Rates included in firm proposals to borrow or lend.
C. Rates that potential borrowers and lenders have expressed as a willingness to pay or accept, but for which Nuexco is not aware of firm proposals.

[1]Monthly data for 1968 through 1981 appear on pages 32-34 of Report 162 of February 1982.

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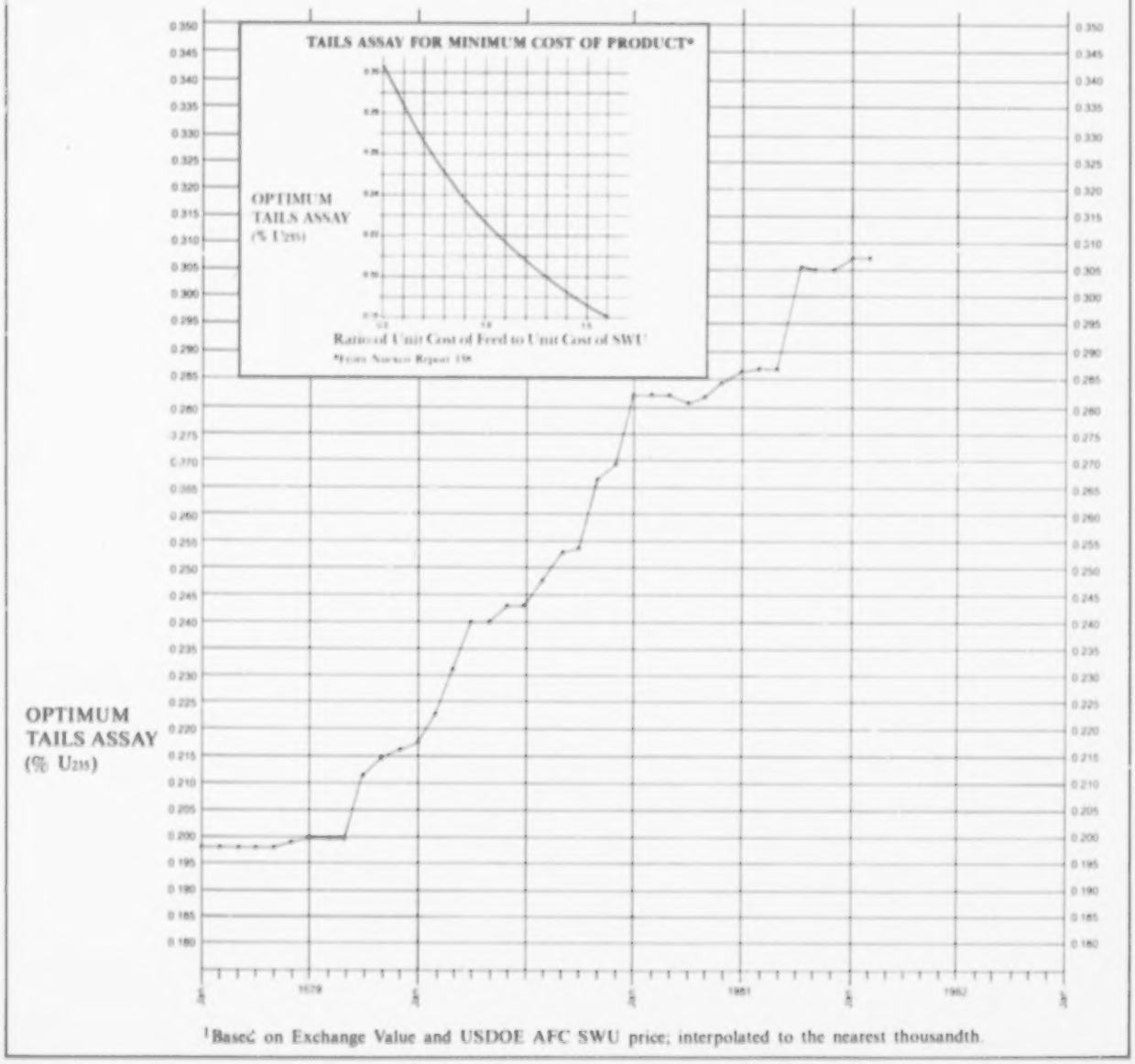
STATISTICAL DATA

OPTIMUM TAILS ASSAY

The optimum tails assay is the tails composition at which the cost of enriched uranium is lowest for given costs of separative work (SWU) and natural uranium feed. It depends only on the ratio of the cost of a kilogram of natural uranium in the form of UF_6 to the cost of a kilogram unit of separative work. Holders of US Department of Energy (USDOE) Adjustable Fixed Commitment (AFC) enrichment contracts have the option to specify, within limits, the transaction tails assay. The transaction tails assay for USDOE Requirements contracts is 0.2 percent U_{235}. For every one-hundredth of one percent increase in the transaction tails assay, natural uranium consumption increases about two percent.

OPTIMUM TAILS ASSAY[1]



[1]Based on Exchange Value and USDOE AFC SWU price; interpolated to the nearest thousandth.

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STATISTICAL DATA

AUSTRALIAN GOVERNMENT STATISTICS

	Price Index of Materials Used in Manufacturing Industry—All Groups (Year 1968-69 = 100.0)[1]	Weighted Average Minimum Weekly Wage Rates—Adult Males Australia Mining and Quarrying (A$)[2]
Annual Avg. 1971[3]	101.5	65.95
Annual Avg. 1972[3]	105.6	71.26
Annual Avg. 1973[3]	124.4	78.96
Annual Avg. 1974[3]	141.9	108.07
Annual Avg. 1975[3]	150.4	132.55
Annual Avg. 1976[3]	168.4	160.93
Annual Avg. 1977[3]	192.0	179.03
Annual Avg. 1978[3]	198.5	190.04
Annual Avg. 1979	248.8	196.34
Annual Avg. 1980	321.8	218.01
Annual Avg. 1981	355.2	235.62
Oct 1980	348.2	221.07
Nov 1980	350.4	221.50R
Dec 1980	351.7	222.41R
Jan 1981	357.8	230.58R
Feb 1981	356.6	230.41R
Mar 1981	355.2	229.66R
Apr 1981	354.6	229.38R
May 1981	353.4	237.31R
Jun 1981	360.4	237.62R
Jul 1981	356.9R	237.54R
Aug 1981	359.7R	237.54R
Sep 1981	357.2R	237.51R
Oct 1981	351.4R	238.77R
Nov 1981	350.5R	240.41R
Dec 1981	348.7P	240.76P

P = Preliminary R = Revised since last month

[1]Australian Bureau of Statistics, Canberra: "Price Index of Materials Used in Manufacturing Industry" (Catalogue No. 6411.0), Table 3.
[2]Australian Bureau of Statistics, Canberra: "Wage Rates, Australia" (Catalogue No. 6312.0), Table 1. Figures for the latest fourteen months shown are subject to revision.
[3]Monthly data for 1970 through 1978 appear on pages 4.7 and 4.8 of Nuexco Report 138.

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STATISTICAL DATA

CANADIAN GOVERNMENT STATISTICS

	Industry Selling Price Index: Manufacturing (D 500000)[1] [2] (1971 = 100.0)	Wage-earner Data: Average Hourly Earnings (C$)[3] [4]		
		Metal Mining, including Milling (SIC 050-059)	Primary Metal Industries, non-ferrous (SIC 296-298)	Chemicals and Chemical Products (SIC 370-379)
Annual Avg. 1977	174.3	8.18	6.50	6.51
Annual Avg. 1978	190.4	8.76	6.82	6.97
Annual Avg. 1979	217.9	9.60	7.35	7.67
Annual Avg. 1980	247.2	10.59	8.05	8.50
Oct 1980	256.0	11.05	8.28	8.82
Nov 1980	257.8	11.11	8.38	8.77
Dec 1980	258.4	11.13	8.32	8.92
Jan 1981	263.3	11.27	8.51	8.90
Feb 1981	263.7	11.43	8.59	9.00
Mar 1981	265.5	11.47	8.63	9.17
Apr 1981	267.9	11.73	8.76	9.33
May 1981	270.0	11.99	8.90	9.49
Jun 1981	272.3	11.80R	9.16	9.57
Jul 1981	274.3	11.92R	9.20	9.62
Aug 1981	276.1R	11.83R	9.15	9.63
Sep 1981	276.6R	12.63R	9.22	9.77
Oct 1981	278.8R	12.82R	9.35P	9.91R
Nov 1981	278.2P	12.96P	9.44P	9.92P
Dec 1981	279.2P	—	—	—

P = Preliminary R = Revised since last month

[1]Statistics Canada, Prices Division, Ottawa; "Industry Price Indexes" (Catalogue 62-011), Table 1. Indexes for the most recent six months shown are subject to revision.

[2]Monthly data for 1973 through 1978 appear on page 4.10 of Nuexco Report 138.

[3]Statistics Canada, Labour Division, Employment and Payrolls Section, Ottawa; "Employment, Earnings and Hours" (Catalogue 72-002), Table 2.

[4]Monthly data for 1977 and 1978 appear on page 4.11 of Nuexco Report 138.

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STATISTICAL DATA

REPUBLIC OF SOUTH AFRICA STATISTICS

	Average Declared Working Costs per Metric Ton of Gold Ore Milled (Rand)[1]	Consumer Price Index[2] (1975 = 100, except where otherwise indicated)	Wholesale Price Index All Groups (1975 = 100)	Total Employment in Mining and Quarrying (Code 35)[5]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[5]
Annual Avg. 1970[3]	7.34	100.3[4]	—	655,346	399,164
Annual Avg. 1971[3]	7.88	106.4[4]	59.1	652,294	415,956
Annual Avg. 1972[3]	8.79	113.3[4]	63.9	623,067	443,933
Annual Avg. 1973[3]	10.51	124.1[4]	72.3	684,743	572,133
Annual Avg. 1974[3]	13.18	138.5[4]	85.3	674,140	761,596
Annual Avg. 1975[3]	16.71	157.2[4]	100.0	639,473	1,003,617
Annual Avg. 1976[3]	19.30	174.7[4]	115.1	671,240	1,212,983
Annual Avg. 1977[3,6]	23.87	194.4[4]	130.0	712,006	1,420,670
Annual Avg. 1978[3,6]	27.14	137.2	142.7	664,571	1,537,169
Annual Avg. 1979[3,6]	30.18	155.3	164.5	692,209	1,830,632
Annual Avg. 1980[6]	35.53	176.7	192.1	714,379	2,279,615
Oct 1980	—	186.3	203.1	720,246	204,602
Nov 1980	—	187.8	205.6	716,797	208,345
Dec 1980	37.69	189.9	206.5	705,087	211,829
Jan 1981	—	191.0	207.2	729,575	219,969
Feb 1981	—	193.8	209.8	725,647	210,275
Mar 1981	39.26	195.2	209.9	705,010	210,151
Apr 1981	—	196.4	211.6	719,674	217,124
May 1981	—	197.7	213.2	726,869	219,880
Jun 1981	40.41	200.0	215.3	728,506	237,049
Jul 1981	—	204.6	218.4	735,839	249,080
Aug 1981	—	208.0	222.6	722,684	245,817
Sep 1981	43.28	211.6	224.6R	724,604R	251,502R
Oct 1981	—	213.4R	227.0	717,918	248,159
Nov 1981	—	214.8	229.4	720,255	253,044
Dec 1981	44.52	216.3	230.4	709,612	257,655
Jan 1982	—	217.6	—	—	—

[1]Chamber of Mines of South Africa, Johannesburg; "Analysis of Working Results," published quarterly.
[2]Republic of South Africa Department of Statistics, Pretoria; "Government Gazette: Consumer Price Index for Urban Areas."
[3]Historical data for the Average Declared Working Costs and Consumer Price Index 1970-1979 appear on page 4.9 of Nuexco Report 140.
[4]April 1970 = 100.00.
[5]Bulletin of Statistics, Department of Statistics, Pretoria.
[6]Historical data for Codes 35 and 40 1977-1980 appear on page 28 of Nuexco Report 157.

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STATISTICAL DATA

US GOVERNMENT STATISTICS

	Producer Price Index—Industrial Commodities (1967 = 100)[1]	Producer Price Index—All Commodities (1967 = 100)[1]	Consumer Price Index (1967 = 100)[2]	GNP Implicit Price Deflator (1972 = 100)[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
					Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
Annual Avg. 1971[5]	114.1	114.0	121.3	96.02	4.12	4.15	3.97	3.49
Annual Avg. 1972[5]	117.9	119.1	125.3	100.00	4.56	4.59	4.26	3.71
Annual Avg. 1973[5]	125.9	134.7	133.1	105.80	4.84	4.98	4.51	3.91
Annual Avg. 1974[5]	153.8	160.1	147.7	116.02	5.44	5.63	4.88	4.21
Annual Avg. 1975[5]	171.5	174.9	161.2	127.15	6.13	6.24	5.39	4.64
Annual Avg. 1976[5]	182.4	183.0	170.5	133.71	6.76	6.87	5.91	4.96
Annual Avg. 1977[5]	195.1	194.2	181.5	141.70	7.28	7.67	6.43	5.39
Annual Avg. 1978[5]	209.4	209.3	195.4	152.05	8.23	8.56	7.02	5.82
Annual Avg. 1979[5]	236.5	235.6	217.4	165.46	9.27	9.50	7.60	6.32
Annual Avg. 1980[5]	274.8	268.8	246.8	177.36	10.27	10.63	8.30	6.95
Annual Avg. 1981	—	—	272.4	193.69R	—	—	—	—
Mar 1981	299.6	290.3	265.1	188.14	11.13	11.50	8.84	7.47
Apr 1981	303.5	293.4	266.8	—	11.30	11.63	8.94	7.51
May 1981	304.7	294.1	269.0	—	11.26	11.68	8.99	7.55
Jun 1981	305.1	294.5R	271.3	191.06	11.31	11.88	9.07	7.60R
Jul 1981	306.2	296.0R	274.4	—	11.61	12.19	9.16	7.69
Aug 1981	307.2	296.2R	276.5	—	11.85	12.09	9.19	7.76
Sep 1981	307.2R	295.5	279.3	195.61	12.11	12.68	9.38	7.79
Oct 1981	308.8P	296.0P	279.9	—	12.09R	12.43R	9.37R	7.84
Nov 1981	309.1P	295.5P	280.7	—	12.14R	12.47P	9.42R	7.86R
Dec 1981	310.1P	295.9P	281.5	200.01R	12.05P	12.38P	9.47P	7.92P
Jan 1982	311.7P	298.2P	282.5P	—	—	—	9.67P	7.96P

P = Preliminary R = Revised since last month

[1]US Bureau of Labor Statistics, Washington, D.C.; "Producer Prices and Price Indexes," Table 6 (formerly "Wholesale Prices and Price Indexes"). Producer Price Indexes are revised four months after they are first released to reflect the availability of late reports and corrections by respondents.

[2]US Bureau of Labor Statistics, Washington, D.C.; Consumer Price Index for All Urban Consumers, US City Average, All Items.

[3]US Department of Commerce, Washington, D.C.; Bureau of Economic Analysis, National Income and Wealth Division; "Survey of Current Business," Table A. The GNP Implicit Price Deflator is published quarterly, and seasonally adjusted.

[4]US Bureau of Labor Statistics, Washington, D.C.; "Employment and Earnings," Table C-2. All data based on 1972 revision of SIC Manual. Data for 1970-1976 are adjusted to the March 1977 benchmark. Data for 1977-1978 are adjusted to the March 1979 benchmark. Data for January 1979 and beyond are adjusted to the March 1980 benchmark.

[5]Monthly data 1970-1978 for Producer Price Index-Industrial Commodities, Consumer Price Index, and Employment and Earnings SIC codes 10, 333, and 28, and quarterly data for GNP Implicit Price Deflator appear on pages 4.6-4.8 of Nuexco Report 139.
Monthly data 1977-1978 for Employment and Earnings SIC Codes 10, 333, and 28 appear on page 33 of Nuexco Report 147.
Monthly data 1970-1978 for Employment and Earnings SIC Code 36 appear on page 23 of Nuexco Report 154.
Monthly data 1979-1980 for Employment and Earnings, Revised Establishment Data, all listed codes, appear on page 22 of Nuexco Report 158.
Monthly data 1977-1980 for Producer Price Index-All Commodities, appear on page 21 of Nuexco Report 158.

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NUEXCO REPORT 163
EXECUTIVE SUMMARY

Exchange Value Remained at $23.00

The **Exchange Value** as of February 28, 1982, is $23.00 per pound U_3O_8.

Near Term Supply-Demand Ratio Increases

As indicated in the *Market Data* section, the total of material available for sale in the near term is approximately 10.9 million pounds U_3O_8. Uranium demand in the same time period totals approximately 3.3 million pounds U_3O_8. The ratio of near-term supply to near-term demand for uranium increased from 2.5:1 in January to 3.3:1 this month.

Transaction Value Decreases Thirty Cents to $23.70; Four Uranium Sales Reported

The **Transaction Value** as of February 28, 1982, is $23.70 per pound U_3O_8. It includes fourteen transactions totaling 2.2 million pounds U_3O_8 and covers a period of three months.

Conversion Value Remains at $1.20

The secondary market for conversion services was quiet during February. The **Conversion Value** held steady at $1.20 per pound U as UF_6. No secondary market conversion transactions are reported. Several secondary market conversion transactions are under discussion at price levels consistent with the Conversion Value.

Nuclear Power Progress in 1981

Nuclear power generated 706 million megawatt-hours of electricity in 1981, a 16% increase over 1980. The biggest differences occurred in France and the US, but Sweden, Finland and West Germany had large percentage increases as well. Sixteen reactors started up outside the US in 1981, adding almost 14 GWe to the world's generating capacity. Six reactors were ordered in 1981, four in France and two in Japan. At least ten reactors outside the US suffered schedule delays of one year or more during 1981.

Tsuruga Suspension Lifted. JAPC Received CP for Tsuruga

After a six-month suspension, JAPC's Tsuruga Unit 1 resumed commercial operation in January. MITI issued a construction permit for Tsuruga Unit 2. The permit had been delayed by last year's radwaste spillage incident at Unit 1.

Status of US Waste Disposal Efforts

US waste disposal efforts remain stalled in Congress.

The Arizona Strip

The *Raw Materials* section examines the geology of the Arizona Strip.

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